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street-railway whose track extended over a part of the route, they were unable to proceed far with the work at that time. In the Bentley-Knight system the electric current is taken from conductors contained in and protected by sub-surface conduits, — a system admirably adapted to the crowded thoroughfares of a busy city.

COMMERCIAL GEOGRAPHY.

The Obi Railroad.

THE question of opening the interior of Siberia becomes more and more important. While hitherto the canals between the large rivers, and projects of navigating the dangerous Kara Sea, were foremost among the plans that seemed likely to be realized, the project of a railroad from the lower Obi to the coast west of Nova Zembla has at present assumed definite shape. The Russian newspapers give the following reports of the project: The Obi Railroad, the most northern road ever planned, will be of the greatest economic importance to Siberia. It deserves special attention, as the projectors do not demand any subsidy or government guaranties. The river Malaia-Obi, near Obdorsk, is the starting-point of the projected line, which will take a direction towards the foot-hills of the Ural Mountains. The latter will be crossed in one of the transversal valleys, which are not over one hundred feet above sea-level. It will cross the river Ussa near its source, and reach the ocean through the tundra of Bolchesemelsk. Its terminus will be in the Bay of Shainoudir, near Belcoff Nosse. The total length of the line will be 260 miles. The price of construction, including rolling stock, is estimated at forty thousand dollars, or ten million dollars the whole line. The establishment of a port on the Arctic Ocean in the locality mentioned above, with all modern improvements for loading and unloading vessels, is estimated at one and a half million dollars. To this must be added the cost of establishing a line of river-boats on the Obi and Irtysh, which is estimated at two and a half million dollars. Thus the whole plan requires the expenditure of fifteen million dollars in works of construction.

It is believed that the line can be worked for six months of the year. The products of the remotest parts of the Obi basin will be carried to the shipping port on the ocean in twelve days, while twelve days more will be sufficient to carry them to London. The price per hundredweight is estimated at \$1.30; while on the present route, *via* Barnaul, Perm, St. Petersburg, London, it is \$2.25, the time necessary to accomplish this distance being 130 days.

The railroad, which has been projected by Mr. Golovacheff, is intended as a means for making the transactions of a Siberian commercial company, which has been founded recently, profitable. According to the concession granted by the Russian Government, this road will not be open to the public, but will only be used by the grantee, who proposes to export the grain and stock from southern Siberia, and hopes to be able to furnish the London market with north Siberian fish. On the other hand, the company will import principally machinery, which so far has hardly found its way to Siberia, and other articles which are at present imported by Moscow merchants.

NOTES AND NEWS.

SCREENED from the world by a high fence, and not far from the Edison Laboratory at Orange, N.J., there have gone up two large factory-buildings. In these buildings there are now in operation a hundred thousand dollars' worth of such fine machinery as can be supplied by E. E. Garvin & Sons of New York, Pratt & Whitney and Dwight Slater of Hartford, and Brown & Sharpe of Providence, in the manufacture of the parts of the improved phonograph. The assembling of these will begin at an early date, so that by Jan. 1 one hundred phonographs should be leaving the works each day. Lieut. F. W. Toppa, U.S.N., is the manager.

— Lieut. D. Bruun of the Danish army, says *Nature*, having had a moss dug out in Finderup, in Jutland, has made some discoveries. In the moss were found trunks of oak, beech, and fir trees from 6 to 30 inches in diameter. The branches had in some cases been cut off, but the bark remained. By the side of one of the oak trunks two earthen vessels were discovered, and near another a third, shaped like an urn. In the latter lay a sandal cut from a

piece of leather, with flaps, and leather straps for tying to the ankle, the length of the sandal being 7 inches. It seemed as if the trunks of trees had been placed in a certain position for some purpose or other. About 20 feet farther to the south, and at the same depth, viz., 6 feet, a yoke of oak was found, 5½ feet long and 3 inches thick, being fairly cylindrically cut out in the centre. At each end, were holes, in one of which remained a strap of leather. Other implements of oak were also found, evidently used for carrying. Some of them seemed part of a wheel. Close to the yoke another earthen urn was discovered, which, like the three referred to, was surrounded with sprigs of heather and bramble. Formerly some horns of bullocks and the skeleton of a man in a fur coating were found in the moss. The various objects are now in the Copenhagen Museum, and are said to date from the early iron age.

— Mr. J. W. Osborne of Washington, the well-known inventor of photo-lithography, has presented to the United States National Museum and to the Art Museum in Boston his large and exceedingly valuable collection of proofs and specimens illustrative of the development of photo-mechanical printing. All the important and typical processes are fully represented in each by specimens collected by Mr. Osborne in all the art centres of Europe and America, and include the works of all who have in any measure achieved success in the graphic arts. As soon as it can be properly classified, the collection intended for the National Museum will be placed on exhibition in the section of graphic arts. Mr. Osborne's contribution, the museum authorities assert, has laid a substantial foundation for an exhaustive collection of kindred productions under government auspices at Washington.

— The Philosophical Society of Washington will hold a meeting on Saturday evening, Dec. 8, at which an address will be delivered by the retiring president of the society, Col. Garrick Mallery, on 'Philosophy and Specialties.'

— According to news received in Denmark, Dr. F. Nansen has succeeded in crossing Greenland, but unfortunately was too late to catch the last steamer. It will be remembered that on July 15 Dr. Nansen, accompanied by Lieutenant Sverdrup, two other Scandinavians, and two Lapps, left the whaler 'Jason' in latitude 65° north, in sight of the east coast of Greenland. After twelve days of difficult march across the pack-ice, the coast was reached, but about sixty miles farther south than Dr. Nansen expected to land, the current having carried the ice southward. On Aug. 15 the party began the march across the inland ice, taking a north-westerly direction towards Christianshaab. When a height of about 7,000 feet was attained, the travellers were overtaken by a northerly snow-storm, which compelled them to take a westerly course toward Godhaab. The greatest altitude attained was about 9,500 feet. Finally, after forty-six days of travel, the party arrived at the head of Ameralik Fiord, which is situated a little south of Godhaab, and, by means of an improvised float, Godhaab was reached on Oct. 4. Dr. Nansen despatched immediately two kayaks with letters to Ivigtut, from which place the steamer 'Fox' was to leave about this time. The kayaks reached this place when the steamer was about to leave, and as the captain did not feel justified in delaying his departure, on account of the advanced season, the party will have to winter in Greenland.

— At the meeting of the Royal Meteorological Society held on Nov. 21, Mr. G. J. Symons read a paper entitled 'Results of an Investigation of the Phenomena of English Thunder-storms during the Years 1857-59.' This paper was written nearly thirty years ago. It has now been communicated to the society at the request of the thunder-storm committee. The paper contains a summary, chiefly in statistical form, of some of the results of an investigation into English thunder-storms, and the accidents produced by lightning during the years 1857-59. The author found that in sheet lightning the most prevalent color is white, then yellow, blue, and red; in forked lightning the order is nearly reversed, blue being more than twice as frequent as any other color, then red, white, and most rarely yellow. Sheet lightning was seen about twice as often as forked. Dr. A. Riggenbach exhibited some photographs of cirrus and other fine clouds, which had been obtained by using the surface of a lake as a polarizing mirror.